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LAND USE AND DECOUPLING IN THE EUROPEAN COMMON  
AGRICULTURAL POLICY  
THE IMPACT OF THE 2003 MID-TERM REFORM IN SPAIN

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## 1. BACKGROUND AND OBJECTIVES

In the last two decades the utilised agricultural area (UAA<sup>1</sup>) has been gradually decreasing in both the European Union (EU) and Spain (OECD, 2008). According to the OECD (2008), between the periods 1990-92 and 2002-04 UAA in Spain decreased by 1,054,000 hectares (-3.61%). Even though changes in land use have been common in Europe throughout history (Rabbinge and Van Diepen, 2000), declining land use continues to be a major concern among policy makers (Rounsevell et al., 2006).

First, agricultural land use is related to the strategic nature of food production (Sturgess, 1992). Food security is a hot topic not only in developing countries but, since the 2008 world food price crisis, also in the Western World (Borger, 2008, Lang, 2008). Second, land use is closely related to the environment. Agricultural systems are complex systems interlinked with other natural resources. Besides the obvious importance for food production, agro-ecosystems provide other services such as biodiversity, landscape and erosion control (MacDonald et al., 2000, Brady et al., 2009). If land falls idle or is even abandoned in the long run, this may lead to severe environmental and social consequences (Atance-Muñiz and Barreiro-Hurlé, 2006).

For these reasons, governments take measures that directly or indirectly affect the agricultural sector through both input and output markets (Josling, 1974). Within the EU, the agricultural sector is historically regulated by the Common Agricultural Policy (CAP). The objectives of the CAP are laid down in the Treaty of Rome (ECC, 1957). The CAP has received strong criticism both within the EU and in the international arena. Criticism from within the EU is driven by CAP expenditures, which have become a burden on the EU budget. Criticism from the World Trade Organization (WTO) and international competitors of the EU is focused on the distortions that are created by the CAP instruments on world markets (Daugbjerg and Swinbank, 2007, Zahrnt, 2008).

Consequently, the CAP has changed its intervention instruments by means of three main reforms (Daugbjerg, 2009). The Mac Sharry reform in 1992 introduced the direct area payments to compensate for a decrease in market price support. The Agenda 2000 reinforced the Mac Sharry reform and prepared the EU for the enlargement to Central and Eastern Europe. Concerning the instruments, setting land aside was put into practice. The 2003 Mid-term reform (MTR) substituted the direct area payments for the Single Farm Payment (SFP) scheme. The SFP no longer required farmers to produce to be eligible for support. However, farmers were subjected to environmental cross-compliance conditions.

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<sup>1</sup> Utilized agricultural area (UAA) is defined as the area used for farming. It includes the following categories: arable land, permanent grassland, permanent crops and other agricultural land such as kitchen gardens. It does not include unused agricultural land, forests and land occupied by buildings, farmyards, tracks, ponds, etc.

[http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/Glossary:Utilised\\_agricultural\\_area\\_\(UAA\)](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Utilised_agricultural_area_(UAA))

In line with earlier CAP reforms, the MTR further lowered intervention prices (OECD, 2004a). Furthermore, there were sector-based reforms for olive oil, cotton and tobacco (2004), sugar (2005) and fruits and vegetables (2007). In 2009, the CAP was further reformed with the Health Check.

Through these three main reforms, the CAP progressively weakens the link between public intervention and production. In the literature, this process is referred to as decoupling (OECD, 2001a). This implies changes in producers' behaviour and ultimately in factor allocation. Policy makers argue that the decoupling of agricultural policies allows for a more optimal decision-making process. As public intervention in agriculture declines, farmers are expected to base production decisions on market signals. As a result, a more efficient use of resources is achieved.

The literature discusses different hypotheses with respect to the impact of decoupling on land use. In a deterministic world –with no risk or uncertainty– factor allocation would only be affected by those policies that modify the incentive prices faced by farmers (OECD, 2001a, Serra et al., 2009). More recent studies link the impact of decoupling to the notion of uncertainty. Decoupling may affect land use by altering farmers' attitudes related to risk and wealth (Bhaskar and Beghin, 2010, Hennessy, 1998, Koundouri et al., 2009). Furthermore, decoupling agricultural support can also affect labour allocation decisions (Serra et al., 2005). Both investment and production decisions may be altered through the capitalization of decoupled payments into land prices (Kilian et al., 2008). This in turn may influence the land market and business entry and exit decisions. Ultimately, decoupling may affect the overall structural adjustment of the agricultural sector (Ahearn et al., 2005, Moreno-Pérez and Ortiz-Miranda, 2008). There are a number of quantitative studies that simulate the impact of decoupling on European agriculture using partial and general equilibrium models. Results of these models predict a decrease in land use for the main crops ranging between 1-10% (OECD, 2004a, Sckokai and Moro, 2006, Balkhausen et al., 2008).

The impact of decoupling on land use may differ between different regions in Spain. An important determinant of land use in Spain is the regional difference in land productivity. Although there is evidence of convergence among Spanish regions (Castillo Valero, 1998), differences in agricultural productivity at the regional level still remain (Expósito Díaz and Rodríguez González, 2001). While some regions show high growth rates, others exhibit rather stable or even negative rates of productivity growth (Millán and Aldaz, 1996, Expósito Díaz and Rodríguez González, 2001). Regional differences in productivity are, among others, related to geographical and climate conditions and differences in the agricultural structure.

The main purpose of this thesis is to investigate the regional and temporal land use variation in Spain during the period 1995-2008. Even though during these periods there were two reforms, namely the Agenda 2000 and the MTR, the latter will be the focus of this thesis. In particular, this thesis will

evaluate the effect of the introduction of the SFP scheme in 2006 on land use. Furthermore, this research aims to shed light upon the ways the MTR has influenced land use.

Using Spain and a comparison of Spanish regions as a case-study in this thesis is interesting. Around 60% of the total country's area is used as farmland (MAGRAMA, 2010). Furthermore, Spain presents a high heterogeneity regarding the nature of its agricultural systems. Different regions grow different crops and are influenced by different geographical and climate conditions. Therefore, a differential impact is expected in different regions.

In this thesis the main research question investigated is whether and how land use has been affected by the introduction of the MTR, in particular the SFP. The following research questions will be considered in this thesis:

- How has agricultural land use changed in Spain during the period 1995-2008?
- What has been the impact of the MTR on land use changes in this period?
- Through which mechanisms has the MTR influenced land use in Spain?

To do so, we use a panel data set from the Ministry of Agriculture (MAGRAMA, 2010). The data set covers seventeen Spanish regions for the period 1995-2008. By using panel data we are able to track the same region over time. Moreover, we can control for unobserved regional fixed effects, such as differences in farm structure and geographic and climate conditions.

To obtain explanations for the rationale behind potential changes in land use, we use the results of semi-structured interviews and focus group discussions with farmers, representatives of agricultural unions and the input industry. The focus group discussions dealt with the perceived impact of decoupling on land markets, production decisions and the financial structure of the farm.

The remainder of this thesis is organized as follows. The second chapter discusses the existing literature on the impact of decoupling of agricultural support on land use. The third chapter presents the two empirical approaches (i.e. panel data analysis and focus groups). Chapter four reports the results. Finally, chapter five presents the conclusions.

## **2. LITERATURE REVIEW AND HYPOTHESIS FORMATION**

### **2.1. INTRODUCTION**

This chapter presents an extensive literature review of the reasons for changes in land use due to the decoupling of agricultural policies. It also provides an overview of empirical evidence on land use changes due to agricultural policy reforms. Decoupling is the shift from government support based on current production decisions to support based on historical production decisions (Baffes and De Gorter, 2005). Despite its current relevance, the discussion on decoupling is not new. Since Nicholls and Johnson (1946), policy makers have deliberated on less distorting agricultural policies to move the primary sector to a free market situation. For example, Swerling (1959) advocates linking the support in the United States (US) agriculture to income declared in tax returns in previous years. In the EU context, Nash (1965) proposes compensating farmers by paying the difference between the income earned under protection and what would be earned in a free market situation. Marsh (1970) and van Riemsdijk (1973) stress the importance of having a support system that is limited in time.

So far the decoupling of the CAP has been done by means of three consecutive reforms (Daugbjerg, 2009). The 1992 (Mac Sharry) Reform and the Agenda 2000 lowered the intervention prices and introduced compensation through direct area payments. Direct payments were based on the present area planted. The MTR substituted direct area payments by a single decoupled income payment per farm (SFP). Instead of area planted, the SFP is based on rights linked to historical use of land between 2000 and 2002. Furthermore, the SFP is conditional on compliance with environmental, food safety and animal health and welfare standards, the so-called cross-compliance. EU Member States were allowed to adapt the timing and implementation of the reform. At the outset of the reform, Member States could choose when to apply it –but always between 2005 and 2007- and how to apply it.

In this regard Member States could opt for three systems of payment. In the historical model each farm received a payment according to its historical records. The regional-based system averaged historical records across farms. Finally, a combination of both was also allowed. Furthermore, Member States had the option of keeping a share of production coupled to the compulsory use of land. The objective was to ensure a certain level of land use in marginal areas (Kelch and Normile, 2004).

### **2.2. THE IMPACT OF DECOUPLING AGRICULTURAL SUPPORT ON LAND USE**

Agricultural policies can play an influential role in determining land allocation. Adams et al. (2001) study the effects of two different direct income payment mechanisms in the US. Their results point to a weak relation between changes in crop production and direct income payments. Key et al. (2005) explore the

effect of agricultural programs on land allocation by comparing farms benefiting from the policy versus those that don't. Results show that farmers tend to allocate more land to program-crops.

Apart from the impact on cropping decisions, agricultural policies may also affect the decision to stay in business. This has an effect on the structural adjustment of the agricultural sector. Structural adjustment implies that the number of farms decreases while the size per farm increases. Theoretically, farms that become larger take advantage of economies of scale and become more efficient in resource use (Huffman and Evenson, 2001). Agricultural policies that either promote structural adjustment or permit inefficient farms to stay in business affect land use (Chau and de Gorter, 2005). Ahearn et al. (2005) study the link between productivity, agricultural policies and structural change. They report an inverse relationship between direct payment programs and the proportion of small production units. Furthermore, these authors find that large farms are more likely to produce more high value crops.

The different mechanisms through which agricultural policies exert influence on land use decisions are widely discussed in the literature. If agricultural policies disturb relative prices and thereby expected profits, there will be a direct effect on land allocation. Furthermore, agricultural policies may also affect land use through the effect on farmers' wealth and risk perception, labor decisions and expectations. Recent literature shows that risk belonging to the variability in yields and prices and ultimately in farmers' income can have an impact on land allocation (Chavas and Pope, 1985, Hansen and Singleton, 1983, Wolf and Pohlman, 1983). In the US, Chavas and Holt (1990) evaluate the effect of price support policies on land allocation decisions considering the existence of risk. They highlight the importance of the risk reducing effect of price policies on cross-crop land allocation. Following the work of Chavas and Holt (1990), Hennessy (1998) investigates how the decoupling of agricultural policies influences farmers' wealth and thereby their risk perception. Hennessy derives two different types of effects. First, the wealth effect is induced by an augmented wealth –through higher land values and income. On the other hand, direct payments may also stabilize farmers' income. Decreasing income variability may reduce farmers' risk aversion and allow them to make riskier decisions. This is known as the insurance effect. In addition, an increase in wealth may ease farmers' credit constraints, as demonstrated by Roe et al. (2003). Nevertheless, Goodwin and Mishra (2006) report only a minor effect on acreage on several large land users as a result of a higher credit availability.

Agricultural policies can also have an effect beyond the current context or time period. Even for risk neutral farmers, expectations about the nature and sequence of different reforms can affect land use. Agricultural policies can generate two kinds of expectations for farmers, namely expectations about the levels and duration of payments and expectations about the eligibility for payments (Burfisher and Hopkins, 2003).

### **2.3. EMPIRICAL EVIDENCE OF THE IMPACT OF CAP REFORMS ON LAND USE IN THE EU**

In recent years different papers have focused on the effects of CAP reforms on land use. Oude Lansink and Peerlings (1996) model the effects of the 1992 Mac Sharry reform on Dutch arable farms. They show that the decrease in intervention prices and the introduction of direct area payments reduced the land allocated to cereals and oilseeds, while it slightly increased the area of root-vegetables. Furthermore, there seems to be a heterogeneous impact on different types of farms. Guyomard et al. (1996) study the effect of the Mac Sharry reform using aggregated data for France. The impact of the reform varies for different crops. Soya, maize and other cereals are affected the most negatively. Barley, wheat and rapeseed area also decreased but to a lesser extent.

Moro and Sckokai (1999) measure land allocation responses to the Agenda 2000 reform by using a sample of arable farms in Italy. They conclude that the main effect of the Agenda 2000 is a decline in oilseeds area and an increase in land allocated to cereals, particularly wheat. Similar results are obtained by Gohin and Guyomard (2000) and Gullstrand (2003) accounting for the Agenda 2000 in France and Sweden respectively. In a broader analysis including risk, Sckokai and Moro (2006) investigate the magnitude of risk-related effects of the CAP regime on arable crops on a sample of Italian specialized arable crop farms. Their hypotheses are based on the findings of Hennessy (1998) and their model is based on Moro and Sckokai (1999). They reassert the results obtained by Moro and Sckokai (1999) concerning the effect of substituting intervention prices for direct payments. Furthermore, they demonstrate that when accounting for risk, there is an additional positive effect on land use. As reported by Hennessy (1998) the insurance effect accounts for 10 per cent of land use change in arable crops.

Balkhausen et al. (2008) report the effects of CAP reforms on aggregate land use. The MTR is expected to result in a decrease in cereal area ranging from 1 to 7.5 per cent. However, they report high variability at the regional level. Gallerani et al. (2008) conduct a cross-country study at the European level concerning the effects of the MTR on producers' investment behavior. They estimate that the MTR will lead to an overall reduction between 1 and 21 per cent of UAA.

One of the potential explanations for these estimates and their variability is the way in which farmers react to changes in agricultural policy. Breen et al. (2005) investigate Irish farmers' intentions in response to the 2003 MTR. The majority of farmers surveyed stated to have no intention of modifying their production decisions. Douarin et al. (2007) survey farmers in five EU countries. They show that farmers in France and England are unlikely to alter their production decisions. On the contrary, farmers in New Member States show willingness to increase their farm area. In another cross-country study, Tranter et al. (2007) focus on the particular decision of idling land as a consequence of the 2003 MTR. No significant intention of taking more land out of production is reported. However, in their analysis of the potential effect of the 2003 MTR on marginal regions, Chatellier and Delattre (2005) and Roselli et

al. (2008) provide evidence of land abandonment in marginal areas after the introduction of decoupling in the CAP.

Muñiz and Hurlé (2006) investigate the potential effects of the MTR on marginal areas in Spain. Their results show that given the current situation on world markets, the MTR will induce a reduction of land used in low productive agricultural systems. Júdez et al. (2008) analyze the impact of the MTR through a comparison between the actual partial decoupling and the hypothetical total decoupling. Their results show that both partial and total decoupling decrease UAA as compared with the base scenario (Agenda 2000). Furthermore, they predict a decrease in land use for cereals production of about 1%. Industrial crops are expected to decrease between 1 and 20%, whilst pastures are expected to decrease by 5%.

## **2.4. CONCLUSIONS**

The SFP implied a change in the way support was given to the producer. With the reform, farmers are no longer forced to cultivate land to be eligible for the payment. In the situation of Spain, a difference in land use response is expected across different farming systems. In Spain two major farming systems co-exist namely dry-land and irrigated farming. At a territorial level the main difference in agricultural productivity is determined by the irrigation. Dry-land agriculture covers a large share of agricultural land in all regions.

Different responses are also expected for specific crops. Cereals and industrial crops have been subjected to the same percentage of decoupling, i.e. up to 75% of the support was decoupled whilst 25% remained coupled to production. Furthermore, the quality premium for durum wheat was fully decoupled. Durum wheat is mainly cultivated in low-productive dry-land. With no incentive to produce, farmers are expected to decrease durum wheat production. Due to the lack of more profitable production alternatives, a decrease in agricultural land use might be observed. Therefore, an increase of fallow land can be expected. In the long-run, this process may result in an increase in forest area.

On the other hand, in regions with more productive land and more profitable alternatives, the SFP may not have a negative effect on land use or even induce expansion since farmers now have full freedom to choose what to plant without losing the subsidy.

### 3. METHODS

#### 3.1. PANEL DATA ANALYSIS

We use time series and regional land use data from 1995 to 2008 for the 17 Spanish regions. The data is collected from the Agro-food Statistical Yearbook of the Ministry of Agriculture, Food and Environment (MAGRAMA is the Spanish acronym). The data set is a balanced panel.

Panel data techniques allow us to control for unobservable region-specific effects that we are unable to measure due to lack of data. These unobservable region-specific effects can be either considered as random or fixed. If observations are randomly selected from a broader population, random effects are more suitable (Baltagi, 2008). In our case, we choose a fixed effects model because our analysis covers the 17 Spanish regions.

In a first modelling exercise, we run two fixed-effect panel data regressions, one for dry-land and one for irrigated land. Figure 1 shows the territorial importance of cereals, meadows and olive groves. A set of regional dummy variables are used to capture time-persistent, regional differences. A time-specific dummy variable is used to represent the launching of the MTR. The MTR was launched in 2003 while Spain approved its application from 2006 onwards. This justifies the choice of a dummy variable representing the period after the application of the MTR in Spain, covering the period 2006-2008. The dummy takes the value 1 for the period 2006-2008 and 0 otherwise.

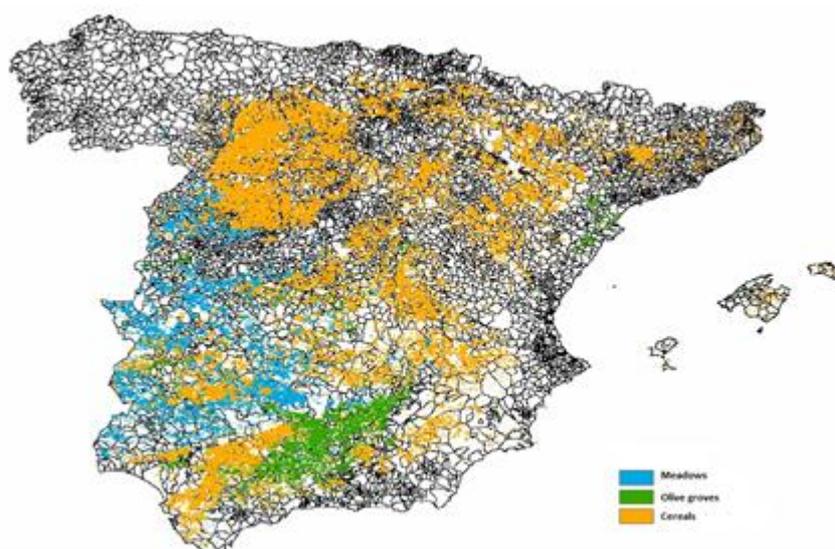


FIGURE 1 TERRITORIAL IMPORTANCE OF THREE MAIN SPANISH AGRO-ECOSYSTEMS.

In a second model, we consider changes in major land use allocations per region, including pasture area, arable crops area, permanent crops area, forest land and fallow land. The dependent variable is the share of each type of land use over the total land use. Total land use has been calculated as the sum of the area under each of the five types of land use considered. If there is a change in agricultural land, we expect to see an effect on forest land as well (Arriaza et al., 2006). As in the first modelling exercise, a dummy variable representing the period after the application of the MTR in Spain is also applied.

### **3.2. FOCUS GROUP METHODOLOGY**

Semi-structured interviews and focus groups are used to study the potential mechanisms through which the MTR can affect land use decisions.

Semi-structured interviews support the arousal of issues of interest concerning a particular topic. The semi-structured interviews are conducted as a starting point for the later focus groups. These interviews provide an idea of the potential results of the participatory research that is conducted in the second stage. Interviews are prepared beforehand to ensure that information about particular topics is obtained from each participant.

Focus groups act as a discussion forum which facilitates researchers to collect different perspectives on a particular topic. Focus groups allow constructing hypotheses and causalities by allowing participants to give insightful and reasoned feedback to questions. The benefits are demonstrated in social research (Desvousges and Kerry Smith, 1988, Krueger and Casey, 2000).

For this research, volunteer participants were recruited from agricultural unions, water users associations, agricultural cooperatives and input companies. Focus groups were led into a discussion about the three different ways that the new MTR could influence land use. The focus groups were recorded. After each session the main points were agreed together with the participants. Three main hypotheses were laid down as the main drivers of the effect of the CAP reform on land use.

Questions were designed to identify participants' opinions about the ways in which the MTR could influence land use (table 1). In the region of Cordoba, a sub-topic was designed to deal with olive grove. The first set of questions dealt with the effects of the SFP on the land market. The SFP may disturb land rental prices and therefore the amount of rented land. The second set of questions considered the effects of the MTR on farmers' production decisions (i.e. amount of fallow land put into production or the crop mix). Third, focus groups discussed the impact on farms' financial and cost structure. After every discussion, an individual questionnaire was delivered among participants.

**TABLE 1** FOCUS GROUPS DISCUSSIONS QUESTIONS.

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*Effects on land market*

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I.	Is there in this province land transfer without SFP?
II.	Which is the effect of the SFP on the land market?
III.	Does the SFP disturb the land rental prices?
IV.	Are there more or less land rental contracts with the SFP

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*Effects on production decisions*

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I.	Is there any change in crop mix since the MTR?
II.	Is there any change in the amount of fallow land?
III.	Does the CAP Health Check influence farmer production decisions?
IV.	Does the farmer react more to market signals?

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*Effects on financial and cost structure*

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I.	Which is the destiny (e.g. land use expansion, on-farm investment) of the SFP?
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## 4. RESULTS

This chapter explores the results obtained from the panel data analysis and the focus groups. Section 4.2 presents the results of the fixed effects analysis that was used to explain the evolution of agricultural land use on dry and irrigated land. Section 4.3 describes the results of the regional land use evolution. Section 4.4 provides the results of the focus group discussions.

### 4.1. AGRICULTURAL LAND USE CHANGE IN SPAIN IN THE PERIOD 1995-2008: MAJOR CROPS

The fixed effects panel data analysis is used in estimating the model. Seventeen cross-sections concerning the 17 Spanish regions are included. There are 221 panel observations, 13 for each region. The regression equation has been run for six types of agricultural productions in both dry and irrigated land. The estimated results are reported in Table 2 and Table 3.

For dry land, all trend coefficients are negative and significant at 1%. In the period 1995-2008, area devoted to cereals decreased at an annual rate of 0.36%. Industrial crops area decreased at an annual rate of 0.26%. Fodder crops area decreased at 0.32% per year. Horticultural crops area decreased at an annual rate of 0.29% while vineyard area and olive groves area decreased at 0.28% and 0.23% per year respectively. The dummy variable representing the introduction of the MTR is in all cases negative and significant at 1%.

On irrigated land, except for vineyard and olive groves, all estimated trend coefficients are negative and significant at 1%. Cereals are decreasing at 0.27% per year. Industrial crops are decreasing annually by 0.30% while fodder and horticultural crops are decreasing at an annual rate of 0.28% and 0.25% annually. The dummy variable representing the introduction of the MTR is in all cases negative and significant at 1%.

Based on the results presented in tables 2 and 3, I conclude that the MTR has exacerbated the decrease in land devoted to agricultural productions. It has affected both dry-land and irrigated agriculture. The impact has been stronger in the former.

TABLE 2 ESTIMATED DRY LAND FUNCTION IN SPAIN, 1995-2008. DEPENDENT VARIABLE = LN (DRY LAND).

	Cereal		Industrial crops		Fodder crops		Horticultural crops		Vineyard		Olive groves	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
<b>Constant</b>	16,15	***	12,85	***	13,02	***	8,58	***	12,56	***	10,10	***
<b>Trend</b>	-0,36	***	-0,26	***	-0,32	***	-0,29	***	-0,28	***	-0,23	***
<b>Dummy MTR</b>	-3,25	***	-1,77	***	-2,78	***	-1,61	***	-3,21	***	-2,32	***
<i>Fixed effects</i>												
<b>Galicia</b>	-3,08	**	-9,95	***	0,92		0,68		-0,76		-7,36	***
<b>Asturias</b>	-6,20	***	-10,24	***	-0,99		-0,26		-5,46	***	-7,54	***
<b>Cantabria</b>	-6,18	***	-8,73	***	-1,81	*	-0,55		-6,42	***	-7,54	***
<b>Vasc Country</b>	-3,16	**	-4,15	***	-1,81	*	0,02		-2,16	*	-3,63	***
<b>Navarra</b>	-2,06		-3,30	***	-2,12	**	0,39		-1,44		-0,99	
<b>Aragon</b>	-0,98		-2,23	**	-1,18		-3,19	***	-0,42		1,48	
<b>Catalonia</b>	-1,72		-2,50	***	-0,23		0,08		-0,07		2,26	**
<b>La Rioja</b>	-3,17	**	-5,39	***	-3,70	***	-2,67	***	-0,50		-1,14	
<b>Madrid</b>	-2,87	**	-4,86	***	-3,50	***	0,14		-1,15		0,91	
<b>Castile-La Mancha</b>	-0,43		0,08		-0,26		1,28	*	1,70		3,10	***
<b>Valencian C.</b>	-3,72	***	-4,05	***	-2,50	**	-0,12		0,03		2,07	*
<b>Balearic Islands</b>	-3,46	***	-7,05	***	-0,86		-1,03		-3,31	***	0,07	
<b>Extremadura</b>	-1,73		-1,66	*	-0,21		0,67		0,04		2,99	***
<b>Andalusia</b>	-0,92		0,35		-0,05		1,69	**	-0,43		4,27	***
<b>Murcia</b>	-2,94	**	-6,65	***	-5,03	***	-5,35	***	-2,13	**	0,51	
<b>Canary Islands</b>	-6,77	***	-9,87	***	-3,39	***	-0,97		-2,41	**	-6,63	***

\* 0.10 LEVEL OF STATISTICAL SIGNIFICANCE/\*\* 0.05 LEVEL OF STATISTICAL SIGNIFICANCE/ \*\*\* 0.01 LEVEL OF STATISTICAL SIGNIFICANCE.

TABLE 3 ESTIMATED IRRIGATED LAND FUNCTION IN SPAIN, 1995-2008. DEPENDENT VARIABLE=LN(IRRIGATED LAND).

	Cereal		Industrial crops		Fodder crops		Horticultural crops		Vineyard		Olive	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
<b>Constant</b>	13,47	***	12,45	***	12,01	***	10,70	***	7,74	***	4,44	***
<b>Trend</b>	-0,27	***	-0,30	***	-0,28	***	-0,25	***	-0,11		-0,04	
<b>Dummy MTR</b>	-2,43	***	-1,63	***	-2,52	***	-2,80	***	-1,86	***	-1,97	***
<i>Fixed effects</i>												
<b>Galicia</b>	-4,34	***	-9,53	***	-1,29		-0,52		-5,61	***	-3,52	***
<b>Asturias</b>	-10,60	***	-9,53	***	-4,27	***	-3,95	***	-6,30	***	-3,52	***
<b>Cantabria</b>	-10,18	***	-9,28	***	-4,22	***	-5,62	***	-6,30	***	-3,52	***
<b>Vasc Country</b>	-8,98	***	-2,84	***	-3,64	***	-1,76	*	-1,10		-3,52	***
<b>Navarra</b>	-1,83		-2,85	***	-1,19		0,28		1,47		2,63	***
<b>Aragon</b>	-0,30		-1,45		0,68		-0,18		1,15		4,24	***
<b>Catalonia</b>	-0,91		-2,57	***	0,07		0,31		0,43		4,34	***
<b>La Rioja</b>	-2,76	**	-3,09	***	-2,74	***	-0,12		0,63		1,91	**
<b>Madrid</b>	-2,53	**	-4,31	***	-2,84	***	-0,67		-3,45	***	0,06	
<b>Castile-La Mancha</b>	-0,27		-1,00		-0,32		1,19		3,13	***	4,11	***
<b>Valencian C.</b>	-2,10	*	-4,15	***	-2,36	**	0,65		1,94	*	3,99	***
<b>Balearic Islands</b>	-4,03	***	-7,55	***	-2,38	**	-0,69		-5,79	***	-1,95	**
<b>Extremadura</b>	-0,91		-1,56	*	-0,58		0,87		-0,59		3,24	***
<b>Andalusia</b>	-0,53		0,58		-0,79		1,53		0,37		7,04	***
<b>Murcia</b>	-2,98	***	-2,93	***	-2,86	***	1,15		1,50		3,68	***
<b>Canary Islands</b>	-5,55	***	-7,58	***	-3,98	***	-1,23		-1,65		-1,83	*

\* 0.10 LEVEL OF STATISTICAL SIGNIFICANCE/\*\* 0.05 LEVEL OF STATISTICAL SIGNIFICANCE/ \*\*\* 0.01 LEVEL OF STATISTICAL SIGNIFICANCE.

#### 4.2. LAND USE CHANGES OVER THE PERIOD 1995-2008: MAJOR LAND USES

Arable land decreased with 0.1% per year all over Spain. That is consistent with the results presented in table 2 and 3. Fallow land decreased more strongly in the central Spanish Plateau. In Catalonia, Andalusia, Madrid, Galicia and the Vasc Country it decreased but at a slower rate. On the other hand, fallow land increased in Aragon, Valencian C., Murcia, la Rioja and Navarra. In Asturias and Cantabria fallow land did not change.

The area used by permanent crops decreased in Catalonia and Valencian C. In the Vasc Country, Navarra, Extremadura, Madrid and Castile-La Mancha the share of permanent crops' increased at rate between 0 and 0.1%. In Canary Islands, Andalusia, Murcia, La Rioja and Galicia it augmented at a rate superior to 0.1%. In Asturias, Cantabria, Castile-Leon, Aragon and Balearic Islands the share of permanent crops' land was not affected. The evolution of these four types of land use is shown in figure 3.

In the Northern half of Spain the share of pastures decreased with the exception of Galicia, Cantabria, Vasc Country and Navarra. On the contrary, in the Southern half of Spain the share of pasture presents a positive trend. Forest land (figure 2) increased generally all over Spain. Forest land is the type of land that presents a sharper increase rate.

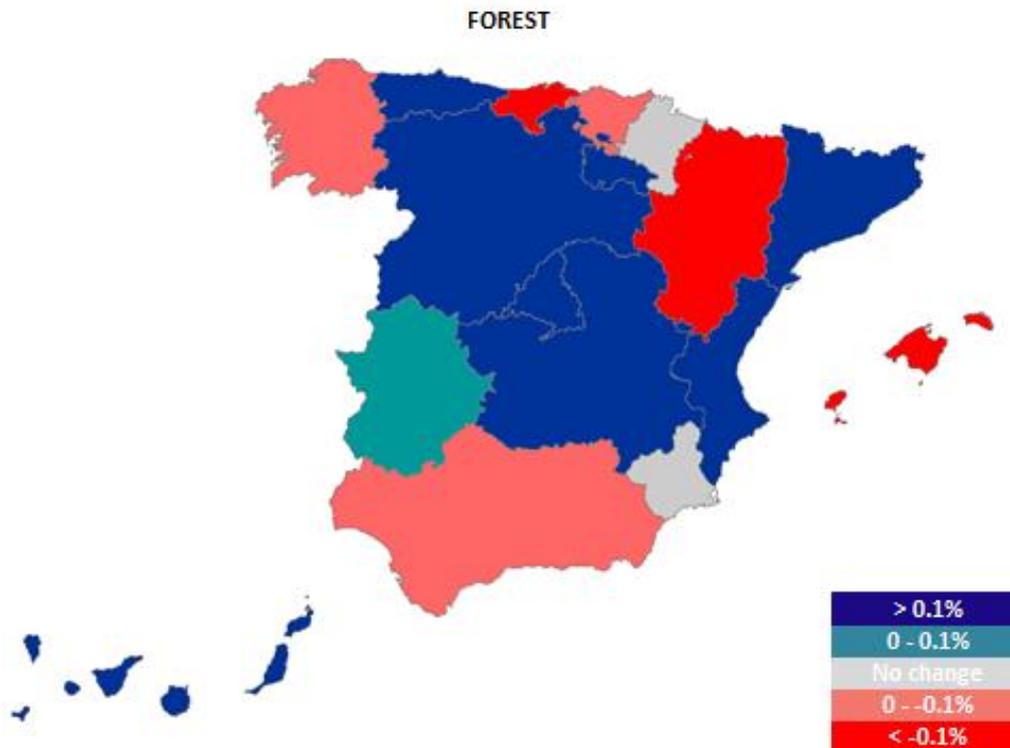


FIGURE 2 EVOLUTION OF FOREST LAND IN SPAIN FOR THE PERIOD 1995-2008.

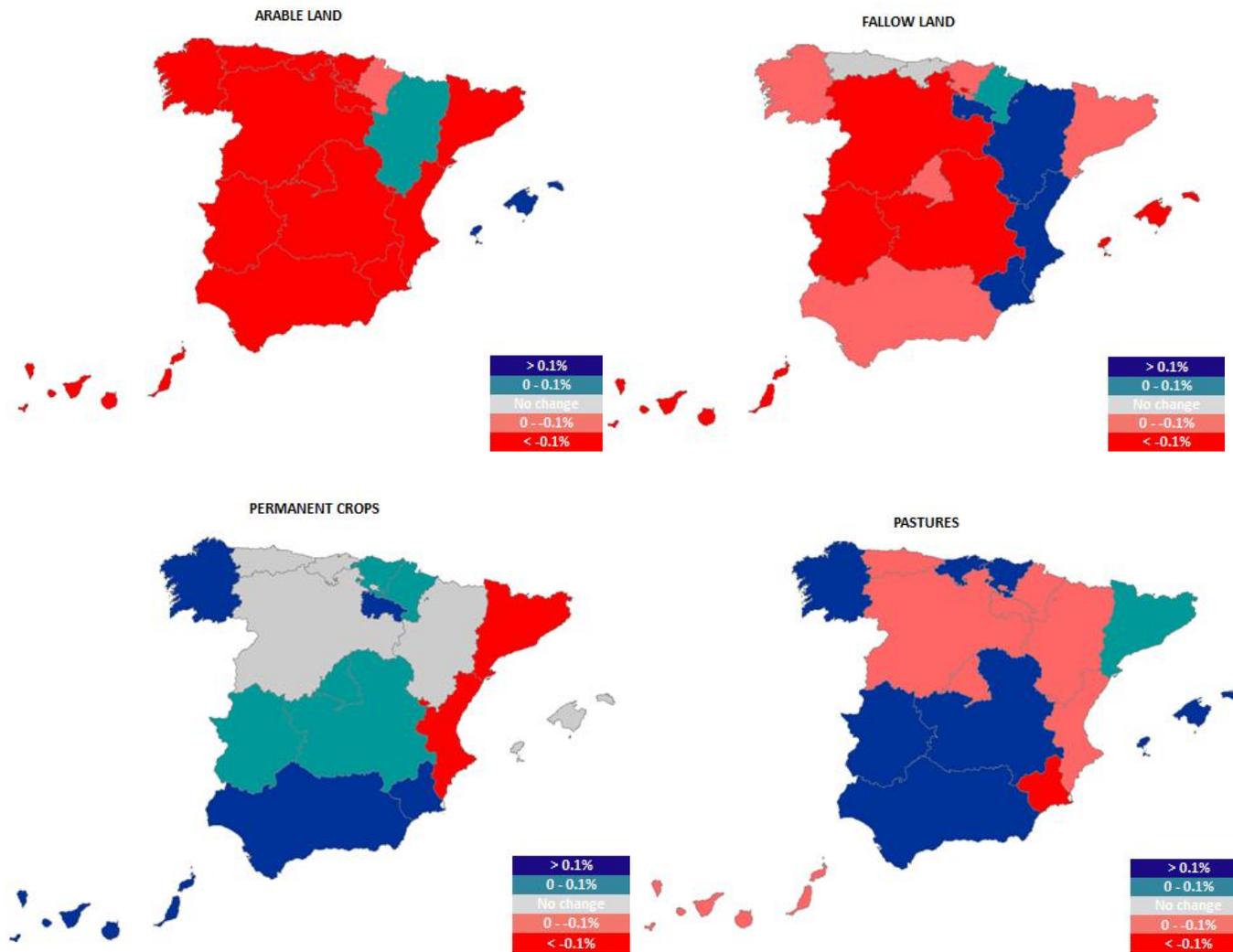


FIGURE 3 EVOLUTION ARABLE CROPS' LAND, FALLOW LAND, PERMANENTS CROPS' LAND AND PASTURES IN SPAIN FOR THE PERIOD 1995-2008.

### 4.3. IMPACT OF MTR ON LAND USE IN SPAIN AND ITS REGIONS

After discussing the change in land use per region, the next question is whether the introduction of the MTR influenced land use in Spain and its regions. The MTR dummy indicates that on average agricultural land use significantly decreased in the period following the reform. The MTR affected land use in different ways (table 6). In Spain, the MTR implied a decrease in total pasture area. In four regions (Cantabria, Andalusia, Basque Country, Catalonia) the MTR reversed the positive trend in pasture land use. In Extremadura, Castile-La Mancha and in the Balearic Islands, the reform intensified the positive trend. In Asturias, Madrid, Navarra, Valencian Community and Murcia, the MTR aggravated the decline in pastures while in Castile-Leon, Canary Islands, La Rioja the MTR reversed a negative trend to an increase in pasture land use.

The MTR accentuated the general decline in arable crop area in Spain. In the largest land use areas (Extremadura, Castile-La Mancha, Castile-Leon and Catalonia) the reform accelerated the decline in arable crop area. In Aragon, a large land use region with a historically positive trend, the MTR reversed the trend.

The area covered by fallow land decreased during the period 1995-2008. The MTR implied a positive change of direction in the area covered by fallow land in nine regions. The period after the MTR slowed down the increase of area covered by woody crops in Canary Islands, La Rioja, Andalusia, Galicia, Murcia, Navarra, Extremadura, Castile-La Mancha, Basque Country, Madrid, Balearic Islands and Aragon. Finally, during the period 1995-2008 the type of land use that increased its area at the fastest rate was forest land. The MTR accelerated the upward trend in forest land. The results for forest land are shown in figure 4 while the other four types of land use are represented in figure 5.

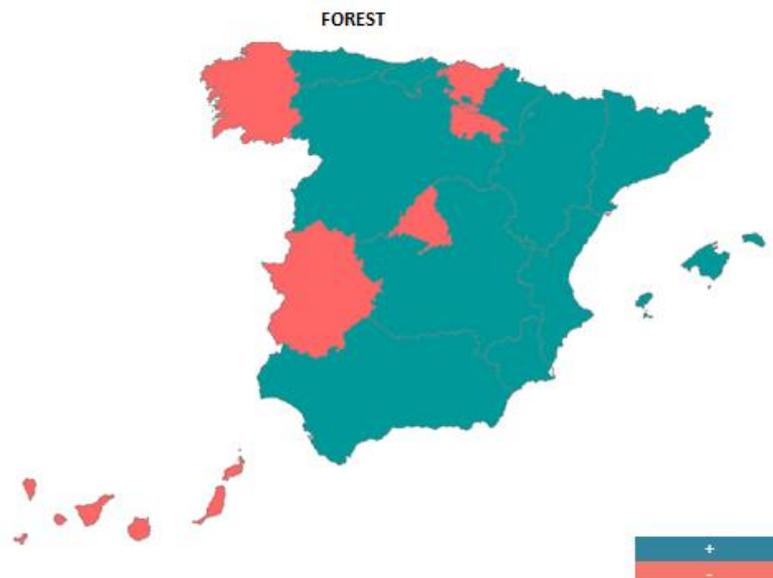


FIGURE 4 EFFECT OF THE MTR ON FOREST.

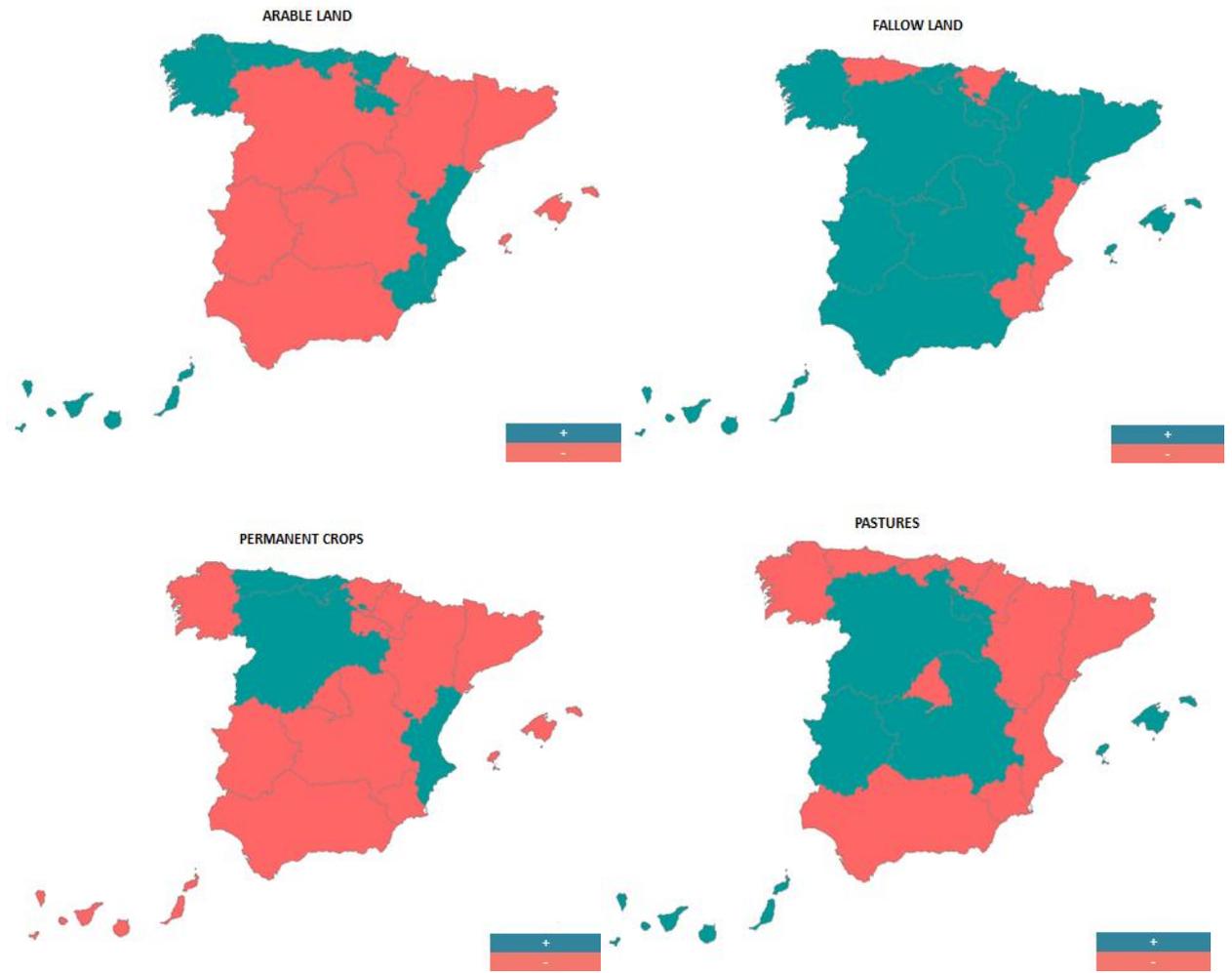


FIGURE 5 EFFECT OF THE MTR ON ARABLE CROPS' LAND, FALLOW LAND, PERMANENTS CROPS' LAND AND PASTURES.

**TABLE 4** IMPACT OF THE MTR ON LAND USE IN SPAIN.

	<i>Pastures</i>	<i>Arable crops</i>	<i>Fallow land</i>	<i>Woody crops</i>	<i>Forest</i>
<i>Positive trend in land use reversed by MTR</i>	Cantabria, Andalusia, Basque Country, Catalonia	Balearic Islands, Aragon	Murcia, Valencian C., Asturias	Canary Islands, La Rioja, Andalusia, Galicia, Murcia, Navarra, Extremadura, Castile-La Mancha, Basque Country, Madrid, Balearic Islands, Aragon	Canary Islands, La Rioja, Madrid, Extremadura, Andalusia
<i>Positive trend in land use reinforced by MTR</i>	Extremadura, Balearic Islands, Castile-La Mancha		Cantabria	Asturias, Cantabria, Castile-Leon	Castile-Leon, Valencian C., Catalonia, Castile-La Mancha, Asturias, Murcia, Navarra
<i>Negative trend in land use reinforced by MTR</i>	Asturias, Madrid, Navarra, Valencian C., Murcia	Navarra, Extremadura, Catalonia, Castile-Leon, Castile-La Mancha, Madrid	Basque Country	Catalonia	Galicia, Basque Country
<i>Negative trend reversed by MTR</i>	Castile-Leon, Canary Islands, La Rioja	Asturias, Basque Country, Valencian C., Cantabria, Canary Islands, Murcia, La Rioja, Galicia	Catalonia, Madrid, Galicia, Andalusia, Castile-La Mancha, Castile-Leon, Balearic Islands, Extremadura, Canary Islands	Valencian C.	Aragon, Balearic Islands, Cantabria

#### **4.4. RATIONALE BEHIND LAND USE CHANGE IN SPAIN SINCE 2006**

This section reports the results of the focus group sessions. The main purpose of these sessions was to investigate the effects of the reform on the agricultural sector in Spain.

##### **4.4.1. EFFECTS ON LAND MARKETS**

Participants of the focus groups were asked to discuss the potential effects of the MTR on land markets (table 7 shows the results). The answers point to an increase in conflicts between land owners and land renters since the MTR. In Spain, renting land has been historically an important way of farm expansion. However, the MTR has made land owners less willing to rent out their land. It was said the SFP was acting as a speculative element on land markets.

One of the statements from the participants was that since the MTR “land without a linked SFP is valueless”. Moreover, SFP rights from livestock farms were purchased and activated with pastures and low productive land to receive the SFP. Retired farmers kept farming to get the SFP as a complement for

their pension. The price of land with a linked SFP right increased. According to the results of individual interviews, 68% of respondents stated an increase in land prices between 10 and 60%.

**TABLE 5** EFFECT OF THE MTR ON THE LAND MARKET, AS STATED IN THE FOCUS GROUPS.

	%
The SFP blocks land market	
Yes	63,33
No	33,33
Don't know	3,33
Land sold without SFP rights is a common practice	
True	16,67
False	80,00
Don't know	3,33
If land without SFP is purchased, the main objective is:	
New crops	12,12
To activate SFP rights	57,58
Other	21,21
Don't know	9,09
Does the SFP disturb land rental prices?	
Yes	80,00
No	16,67
Don't know	3,33
Increase	68,00
Decrease	20,00
Don't know	12,00
Change of 10%-30%	40,00
Change of 30%-60%	40,00
Change > 60%	12,00
Don't know	8,00
At retirement age the farmer decides to	
Keep farming	60,00
Sell the land and the SFP	13,33
Other	20,00
Don't know	6,67

Source: individual questionnaires

#### 4.4.2. EFFECTS OF THE MTR ON PRODUCTION DECISIONS

Focus group participants were asked to state whether the MTR had led farmers to change their production decisions (table 8 shows the results of individual questionnaires). The participants expressed that expectations on forthcoming CAP led farmers to remain active in farming. For example, it was stated that the sales of seeds was increasing because farmers expected 2009 to be a reference year. Participants reported significant acreage decrease in both low yield crops and high variable costs crops. Historically supported crops such as cotton or beet-root sharply decreased in area. The participants stated greater changes in irrigated land than in dry land. Farmers are avoiding costs because of the crisis

of agricultural prices. According to the respondents, the MTR promoted an expansion of fodder crops. Since the introduction of the MTR, sunflower and protein-based crops have increased their area. The increase in fallow land was linked to low agricultural prices rather than the decoupling of support.

**TABLE 6** EFFECT OF THE MTR ON LAND ALLOCATION AND CROP MIX.

<i>Effects on production decisions</i>		
Do farmers change their production decisions due to the SFP		
Yes		73,33
No		26,67
Don't know		0,00
Is the increase of fallow land a direct consequence of the SFP?		
Sí		23,33
No		66,67
Don't know		10,00
From 1 (not important) to 5 (very important), could you quantify the effect of the MTR on fallow land?		
	1	7,69
	2	7,69
	3	30,77
	4	23,08
	5	7,69
Don't know		23,08
Is there any significant change in crop mix since the introduction of the MTR?		
Yes		70,00
No		23,33
Don't know		6,67
Since 1 January 2010 the Health Check comes into effect, implying a complete decoupling of support. Do the farmers change their production decisions?		
Yes		42,11
No		36,84
Don't know		21,05

Source: individual questionnaires

#### **4.4.3. EFFECTS ON THE FINANCIAL AND COST STRUCTURE**

Finally, the effect of the MTR on farms' cost and financial structure was discussed. Focus group participants stated that the SFP helped to cover production costs. Furthermore, the SFP was said to facilitate the access to credit. Farmers with cash constraints could get a cash advance from the bank using the SFP as warrant. It was specified that rather than credit was an advance of liquidity. 41.38% of the respondents stated that the SFP represents between 20 and 40% of the farm revenue while 24.14% stated the SFP was between 40 and 60% of the benefit. Table 9 show the results.

**TABLE 7** EFFECT OF THE MTR ON FARMS' FINANCIAL AND COST STRUCTURE

	%
Which is the SFP's destiny?	
On-farm investment	17,65
Off-farm investment	2,94
Savings	11,76
To cover production costs	67,65
Does the SFP increase credit or liquidity availability?	
Yes	80,00
No	16,67
DK	3,33
Which percentage represents the SFP over the benefits?	
0-20%	3,45
20-40%	41,38
40-60%	24,14
60-80%	0,00
80-100 %	17,24
DK	13,79

Source: individual questionnaires

## 5. DISCUSSION AND CONCLUSION

This chapter draws some major conclusions, provides a general discussion and makes some recommendation for further research. The effects of decoupling agricultural support within the EU have raised concern over the past few years and in particular its implications on rural development and the environment. In this thesis we analyze whether the decoupling of the CAP influences land use in Spain.

Coinciding with earlier works we proffer evidence of the relation between the decoupling process of agricultural policies and land use. The MTR introduced the SFP. The SFP is not tied to actual production but to a historical reference period. The SFP allows farmers to freely choose for the crop mix or to stop cultivating land altogether without losing eligibility for support.

Compared to previous studies, this study offers a spatial perspective of the effects of decoupling of agricultural policies. The results are consistent with existing studies and provide evidence for the notion that decoupling goes hand in hand with a decrease in agricultural land use. This thesis analyzes the effects of the MTR on land use in Spain firstly by means of a panel data analysis and secondly by conducting semi-structured interviews and focus groups. The panel data analysis enabled us to investigate the evolution of different types of land use across Spanish regions and the effect on land use of the launching of the MTR. On the other hand, semi-structured interviews and focus groups provided the rationale behind the potential effects. Data from the Agro-food Statistical Yearbook of the Ministry of Agriculture, Food and Environment (MAGRAMA) of Spain was used. The study accounted for the seventeen Spanish regions and covers the period 1995-2008.

We analyze different land use alternatives accounting for the foremost agricultural productions and more aggregate uses of land. Our first result is a generalized decrease of agricultural land use in Spain. The effect is significant in cereals, industrial crops and fodder. The area covered by vineyards and olive groves presents a negative evolution, but it seems that under irrigated systems the effect is not significant. Furthermore, after the MTR a negative effect is observed on the already negative historical trend. We also analyze changes in the share of land allocation. We find that arable land, permanent crops and fallow land decreased all over Spain whilst permanent crops and forest land increased.

The qualitative research identifies the different reasons behind the changes in land use. Interestingly, we obtain different qualitative arguments that support the panel data results. Land use may have decreased due to higher land prices and lower rental land availability. On the other hand, land use was promoted by the expectations on forthcoming CAP. To a certain extent, the SFP facilitates farmers to stay in business. However, it is difficult to speculate about which reason may be behind the absolute

decrease of agricultural land use. The decrease in industrial crops' acreage was justified by the sharp reduction of both beet-root and cotton area.

The decoupling of the CAP may lead towards more market-oriented agriculture, reducing non-competitive land uses. Given that production alternatives are limited, and devoted to low productive crops is most likely to be taken out of production. These effects are significant at regional level in Spain and account for a large share of the territory. This study contributes to the on-going discussion about the impact of the decoupling of agricultural policies on land use. How different agro-ecosystems respond to changes in agricultural policy poses new challenges to policymakers, requiring more attention to the environmental and social aspects of agro-ecosystem changes. Moreover, with the current uncertain economic times, a country has to reflect on the strategic role of land and the consequences of losing its productive character.

One caveat of the study is the low explicative power of the data employed. It would be meaningful to include variables such as costs, prices and agricultural support per region. To ensure a higher explicability of the effects of decoupling across types of agriculture, the regressions could include data over costs and support received per region.

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